SCHEDULE REQUIREMENTS

The Schedule Requirements are a draft version of a scheduling specification that will be used by UDOT to control scheduling, including aspects of project management, project controls, submittals and documentation, for the Mountain View Corridor (Project). A finalized version of this specification will be made a contract requirement for the preconstruction and construction contracts for the CMGC Contractor, and for the design consultant.

General Philosophy: **Critical Path Method (CPM)** schedules will be utilized to manage time, cost and risk aspects of the Program as they relate to each element of the Program including Program Management, Engineering and Construction, and the interrelationships between each element. The Program Manager will oversee the Program Schedule. Each party will be responsible for developing and maintaining a "Discipline" schedule; the Program Manager shall develop and update the Program Management Schedule, the Engineering Consultant shall develop and update the Engineering Schedule and Contractor shall develop and update the Construction Schedule. The Discipline schedules shall be interrelated through the use of logical relationships and rollup through the use of an Enterprise Project Structure into the Program Schedule. The Discipline schedules and interrelationships shall be developed and established through a coordinated iterative process and fully cooperative efforts of the Disciplines.

The following requirements are a general guideline outlining the minimum requirements of the Construction Discipline schedule(s). Schedule requirements, or methodologies may change as best practices are identified by UDOT during Schedule development process.

A. **Critical Path Method (CPM) Schedules**, herein referred to as "Schedule(s)" will be developed and updated using Primavera Project Management, P6.2. All work associated with these requirements is considered incidental for which no direct payment will be made.

B. Definitions:

1. Activity: A fundamental unit of work in a Project Plan and Schedule establishing the time, cost and resources required for performing or furnishing a part of the Work, or a requisite step. Each activity has defined geographical boundaries, time duration in days and a detailed estimate of cost and resources required to construct the task. Each activity is assigned a unique description, activity number, and activity codes.
2. Constraint: A scheduling restriction imposed on the start or finish of an activity. Use of constraints on activities other than the Project start and finish milestone activities is prohibited unless approved otherwise by UDOT.
3. Cost Loading: The allocation of direct and indirect costs to each activity based on UDOT bid items unless approved otherwise by UDOT. Cost loading shall be based on unit costs and quantity and match the construction cost estimate, opinion of probable cost, or Updated Baseline Schedule of values. Task level cost loading will be utilized in the event bid items do not exist.
4. Critical Path: The longest continuous chain of activities for the Project that has the least amount of total float of all chains. In general, a delay to an activity on the critical path could extend the scheduled completion date. The critical path shall be identified as the longest path as determined by the scheduling software.

5. Critical Path Method (CPM): A network based planning technique using activity durations and the relationships between activities to mathematically calculate a Schedule for the entire Project. The mathematical calculation shall be performed utilizing retained logic.
6. Data Date: The day after the date through which a Schedule is current. Everything occurring earlier than the data date is "as-built" and everything on or after the data date is "planned."
7. Discipline: Discipline refers to the major element of Work; i.e. Program Management, Engineering or Construction for example.
8. Finish Relationship: Each activity shall have an appropriate finish relationship utilizing a finish-start relationship type.
9. Major Subcontractor or Major Supplier: Any subcontractor or supplier of materials or services, whose compensation will meet or exceed $500,000 and/or any subcontractor or supplier of materials or services, action is directly connected to or on the critical path.
10. Milestone: An event activity that has zero duration and is typically used to represent the beginning or end of a certain stage of the Project.
11. Near Critical Path: A chain of activities with total float exceeding that of the critical path but having no more than 10 working days of total float.
12. Predecessor Activity: An activity, which precedes another activity (to which it is logically tied) in the network. Each schedule activity except the Project start milestone shall have a logical predecessor.
13. Prohibitions: The Schedule shall not include or utilize negative lag durations, float suppression techniques and time or date constraints. The Schedule shall not include positive lag durations, unspecified milestones, open ended activities, logic ties and/or sequences that are deemed unreasonable by UDOT. Sequestering of total float through the manipulation of calendars, extending activity durations, logic ties or sequences is prohibited.
14. Qualified Scheduler: An experienced specialist who has successfully completed extensive, verifiable professional training in all aspects of planning, developing, evaluating, analyzing, maintaining and reporting CPM Schedules. The individual shall have a minimum of five (5) years experience performing the duties of planning, developing, evaluating, analyzing, maintaining and reporting CPM Schedules, as a primary responsibility, and shall possess demonstrated proficiency in CPM Schedule methodology and utilization of Primavera Project Management 6.2.
15. Resource Loading: The allocation of the quantity of labor, major equipment and materials to each activity. Resources shall be defined in the scheduling software. Labor Resources shall be defined to a crew level for which crew composition and working hours shall be defined. Labor resources shall be defined as a "labor" resource type. Equipment resources shall be defined for each specific type and size of equipment and shall be defined as a "non-labor" resource type. Material resources shall be defined for each material resource type and shall be defined as a "material" resource type. Each crew, like equipment, and materials must be uniquely identified and assigned to each activity in the appropriate quantity to accomplish the Work within the activity duration. The initial quantity of labor, equipment and materials shall set as the "Budgeted Units" for the resource assignment.

16. Successor Activity: An activity, which follows another activity (to which it is logically tied) in the network. Each schedule activity except the Project completion milestone shall have a logical successor.
17. Two (2) Week Detail Schedule: The two (2) week detailed Schedule is a hand or computer generated bar chart Schedule which spans a forward looking, rolling period of at least fourteen (14) calendar days. The two (2) week schedule shall be updated and submitted to the Engineer on a weekly basis. The two (2) week Schedule shall be based on the accepted Updated Baseline Schedule and provide a greater breakdown of the Updated Baseline Schedule activities. The two (2) week Schedule shall specifically reference the accepted Updated Baseline Schedule activity ID numbers and define subsequent specific daily operations for all work activities scheduled to be performed during the two (2) week period.
18. Time Impact Analysis: A Schedule or schedule fragnet, and narrative report developed specifically to demonstrate what effect a proposed change or delay has on the current scheduled completion date.
19. Total Float: The difference between the earliest and latest allowable start or finish times for an activity which generally represents the amount of time an activity can be delayed without delaying the Project finish date.
20. Work Breakdown Structure (WBS): "The WBS defines the project tasks, or work to be performed, expressed in terms of the product or result of the work, i.e., deliverables, and establishes a relationship between the tasks and the major project objectives. The WBS also establishes the framework for the scheduling and control of the project. It functions to establish a framework for summarizing the Schedule and cost status of the project at progressively higher levels of management" (Cook, 1971).

C. General Requirements

The Work under this Contract shall be planned, scheduled, executed, reported and accomplished using Critical Path Method (CPM) of scheduling, shall be cost and resource loaded as required by this specification or as directed by UDOT, and shall track risk mitigation.

Program Schedule development shall be cooperative effort between the Program Manager, Engineer and Contractor in an effort to achieve Project goals based on UDOT's consideration of Program costs, risks and time.

Activity level cost loading shall be based on UDOT bid items or task levels as directed by UDOT. The cost loading shall match, in quantity, units, unit price and total value, the opinion of probable cost (OOPC) or Guaranteed Maximum Price (GMP) as directed by UDOT. Activity percent complete shall be set to "Units." Updated schedules will be used for payment purposes.

Schedules shall utilize the precedence diagram method (PDM) of scheduling and retained logic method of calculation. The scheduling work shall be performed by a Qualified Scheduler.

The Schedules shall reflect the order of performing the Work as directed UDOT, and shall be based on working shifts of at least eight (8) hours per day a minimum of a five (5) day work week.

Each Discipline shall submit initial and updated Schedules at intervals directed by UDOT. The Schedule submittal intervals will generally follow the opinion of probable cost submittal interval but may be more or less frequent depending on the status of the work of the Discipline.

Schedules will be updated for progress with actual start and finish dates, and plan revisions as appropriate, or as directed by UDOT. The Discipline work shall be executed in the sequence indicated on the current accepted Schedule.

Schedules shall show the order in which the Discipline proposes to carry out the Work with logical links between time-scaled work activities, and retained logic calculations made using the Critical Path Method (CPM) to determine the controlling operation or operations. Each Discipline is responsible for assuring that all activity sequences are logical and that each Schedule reflects a coordinated plan for complete performance of the Work.

Schedules shall comply with the phasing, work constraints, and milestones as defined through the course of Project development, the Contract(s) as well as other contractual terms and conditions.

Significant interaction points and action responsibilities of the Program Manager, Engineer and the Contractor and other entities (such as utilities, local governments, special service districts, etc.) shall be identified in the appropriate Discipline Schedule. The Contractor shall provide assistance in identifying the interaction points and action responsibilities and linking the logical relationships between Discipline schedules.

The Contractor shall furnish network diagrams, narrative reports, tabular reports and Schedule data as requested as requested by UDOT.

The number of activities shall be sufficient to assure adequate planning of the Project, to permit monitoring and evaluation of progress and payments, and to perform analysis of potential impacts or risks that could affect cost and time. Additional activities shall be added as directed by UDOT.

UDOT may require preparation of time impact analyses to determine the effect of proposed changes, risk allocation or impacts in conformance with the provisions in “Time Impact Analysis” specified herein. Changes that do not affect the controlling operation on the critical (longest) path will not be considered as the basis for a time adjustment. Changes that affect the controlling operation on the critical (longest) path may be considered by UDOT for decreasing time or granting an extension of time for completion of the Contract if the changes are found to be compensable by UDOT. Time extensions will only be granted if the total float is absorbed and the scheduled completion date is delayed one or more working days because of the ordered change.

UDOT’s review and acceptance of a Schedule shall not waive any Contract requirements and shall not relieve the Contractor of any obligation or responsibility for submitting complete and accurate information. Schedules that are rejected shall be corrected by the Contractor and resubmitted to UDOT within five (5) working days of notification by UDOT, at which time a new review period of seven (7) working days shall begin.

Errors or omissions on Schedules shall not relieve the Contractor from finishing all work within the time limit specified for substantial completion of the Contract. If, after a Schedule has been accepted by UDOT, either the Contractor or UDOT discovers that any aspect of the Schedule has an error or omission, it shall be corrected by the Contractor on the next Schedule update or as a revised Schedule submittal if requested by UDOT.

Schedule activities are to be described in detail so that the Work is readily identifiable and the progress on each activity can be readily measured. All activity attributes, including but not limited to calendars, activity codes, cost coding, etc shall be “Project” type attributes; i.e. not “Global.” As

a minimum, the following attributes shall be uniquely assigned to each activity within the schedule unless otherwise acceptable to, or required by UDOT:

1. A unique alphanumeric activity ID shall be assigned to each activity. The proposed activity ID format shall be submitted to UDOT for approval prior to implementation.
2. A clear and legible description to easily identify the specific activity. Each activity description shall indicate its associated scope and or location of work by including such terms as, type or description of work, bridge number, station to station location, side of highway (such as, eastbound or southbound), shoulder, ramp name, pipe number, etc.
3. Activities will be defined to a level of detail acceptable to UDOT. Activities shall be defined to a level of detail such that only one WBS assignment can be made to each activity.
4. Each activity shall be additionally described using the following activity codes:

I.	Discipline:	Const	=	Construction

II.	Work Element:	AP	=	Asphalt Paving
		BA	=	Barrier
		BC	=	Box Culvert
		BP	=	Bypass
		BR	=	Bridge
		CG	=	Clearing and Grubbing
		CP	=	Concrete Paving
		CU	=	Curb and Gutter
		EC	=	Erosion Control
		EM	=	Embankment
		EX	=	Excavation
		FN	=	Fence
		GD	=	Grading
		GR	=	Guard Rail
		IR	=	Irrigation
		LS	=	Landscaping
		LI	=	Lighting
		MT	=	Maintenance of Traffic
		PC	=	Procurement
		PM	=	Pavement Markings
		PR	=	Permit
		RW	=	Retaining Wall
		SI	=	Signage
		SD	=	Storm Drain
		SS	=	Sanitary Sewer
		SWPPP		Storm Water Prevention Plan
		TR	=	Pedestrian Trail
		TE	=	Turf Establishment
		TM	=	Traffic Management
		UT	=	Utilities
		WL	=	Waterline

III.	Location:			(To be defined)

IV.	FromSta:	####+##		(From Station)

V.	ToSta:	####+##		(To Station)

V.	Work Type:	PC	=	Permanent Construction
		TC	=	Temporary Construction
		RD	=	Remove and Dispose
		RL	=	Relocate
		RS	=	Remove and Salvage
		PC	=	Procurement
		SU	=	Submittals

VI.	Responsibility:	UDOT	=	UDOT
		Cont	=	Contractor Name
		Subc	=	Subcontractor Name
		Util	=	Utility Company Name
		Vend	=	Vendor Name
		(add one code for each Subcontractor, Utility, and Vendor)		

VII.	Contract Change:	CO No.	=	Change Order Description
		(add one code for each Contract Change)		

The Contractor shall fully utilize the activity code structure shown above and make every effort to enhance this structure. Proposed modifications to the activity code structure shall be submitted in the above format to UDOT for acceptance before implementation. Activity coding shall be assigned consistently and uniformly among all similar activity types.

5. The duration of the activity in working days based on the quantity of work divided by reasonably anticipated production rate(s):
   a. A duration of not less than one (1) working day, except for event or milestone activities, and
   b. Not more than twenty (20) working days, except for non-work type activities such as mobilization, settlement durations, submittal preparation or curing, unless otherwise authorized by UDOT. Level of Effort (LOE) activities may have a duration greater than twenty (20) working days. Use of LOE activities requires UDOT approval.
6. Early start and early finish dates.
7. Late start and late finish dates.
8. Activity Total Float.

9. A clearly defined and logical critical (longest) path.
10. All milestone events; e.g. completion of intermediate dates, traffic switches, etc.
11. Percent complete.
12. Actual start and actual completion dates.
13. At least one predecessor and one successor activity, except for Project start and finish milestones.
14. Codes for work shifts.
15. Actual resource utilization.

As a minimum, the following activities shall be uniquely listed within the Schedule in Work Breakdown Structure (WBS) format for all activities required to complete the items of work necessary to meet the completion requirements of this Contract. Generally including, but not limited to:

16. Project characteristics, important features, and interfaces, including those with outside entities that could affect time of completion.
17. Work performed by the Contractor, subcontractors and suppliers.
18. Submittal development, delivery, review and approval, including those from the Contractor, subcontractors and suppliers.
19. Testing and settlement periods.
20. Utility notification and relocation.
21. Erection and removal of falsework and shoring.
22. Traffic switches.
23. Finishing of roadway(s) and final cleanup.
24. CPM schedule development and reviews.

In addition to the general activity requirements, the following table represents levels one (1) through five (5) of the WBS structure, the minimum levels of the WBS that all resource and Schedule information shall rollup to, however, the Contractor shall provide further detail, to at least level six (6), to ensure a clear understanding of the Contract and construction requirements.

WBS Structure: xxx.xx.xx.xx.xx.xx

Level 1 Level 2 Level 3 Level 4 Level 5

1 Project Element/Location/Stage
- 1 .01 Project Management
- 1 .02 Procurement and Submittals
  - 1 .02.01 UDOT
    - 1 .02.01.01 Submittal Review
    - 1 .02.01.02 Delivery
  - 1 .02.02 Contractor
    - 1 .02.02.01 Submittal
    - 1 .02.02.02 Fabrication
    - 1 .02.02.03 Delivery
- 1 .03 Construction
  - 1 .03.01 Project Management & Mobilization
  - 1 .03.02 Clearing and Grubbing
  - 1 .03.03 Drainage
    - 1 .03.03.01 Surface Drainage and Retention Detention Ponds
    - 1 .03.03.02 Storm Drain and Structures
    - 1 .03.03.03 Temporary Drainage
    - 1 .03.03.04 Culverts
  - 1 .03.04 Lighting
  - 1 .03.05 ATMS
    - 1 .03.05.01 State Furnished Materials
    - 1 .03.05.02 Devices
    - 1 .03.05.03 Conduit
    - 1 .03.05.04 Closed Circuit Television (CCTV)
    - 1 .03.05.05 VMS
  - 1 .03.06 Roadways/Ramps and Local Streets
    - 1 .03.06.01 Roadway Excavation
    - 1 .03.06.02 Embankment
    - 1 .03.06.03 Base Course & Shouldering
    - 1 .03.06.04 Asphalt Paving
    - 1 .03.06.05 Concrete Paving
    - 1 .03.06.06 Curb and Gutter
    - 1 .03.06.07 Permanent Concrete Barrier
    - 1 .03.06.08 Guard Rail
  - 1 .03.07 Signage
    - 1 .03.07.01 Foundations
    - 1 .03.07.02 Sign Installation
  - 1 .043.08 Bridges
    - 1 .03.08.01 Structure Number 1 (One element for each structure)
      - 1 .03.08.01.01 Settlement Period
      - 1 .03.08.01.02 Excavation
      - 1 .03.08.01.03 Embankment/Backfill
      - 1 .03.08.01.04 Geotechnical Instrumentation
      - 1 .03.08.01.05 Piling
      - 1 .03.08.01.06 Footing
      - 1 .03.08.01.07 Abutment
      - 1 .03.08.01.08 Pier/Bent
      - 1 .03.08.01.09 Girder Placement
      - 1 .03.08.01.10 Deck

- 1 .03.08.01.11 Micro Silica Overlay
- 1 .03.08.01.12 Barrier/Railing
- 1 .03.08.01.13 Surface Treatment
- 1 .03.08.01.14 Approach Panel

1 .03.09 Fence
- 1 .03.09.01 Right-of-Way Fence
- 1 .03.09.02 Other Rail Fence

1 .03.10 Retaining Walls
- 1 .03.10.01 Excavation
- 1 .03.10.02 Piling
- 1 .03.10.03 Footing
- 1 .03.10.04 Cast Wall
- 1 .03.10.05 Wall Panel
- 1 .03.10.06 Embankment/Backfill
- 1 .03.10.07 Surface Treatment

1 .03.11 Removals and Salvage
- 1 .03.11.01 Existing Bridge
- 1 .03.11.02 Curb and Gutter
- 1 .03.11.03 Chain Link Fence
- 1 .03.11.04 Guard Rail
- 1 .03.11.05 Median Barrier
- 1 .03.11.06 Concrete Slab
- 1 .03.11.07 Sidewalk
- 1 .03.11.08 Approach Panel
- 1 .03.11.09 Concrete Pavement
- 1 .03.11.10 Asphalt Pavement
- 1 .03.11.11 Temporary Fence
- 1 .03.11.12 Storm Sewer and Culvert
- 1 .03.11.13 Water Main
- 1 .03.11.14 Lighting
- 1 .03.11.15 Signage

1 .03.12 Landscaping
- 1 .03.12.01 Trail Head Landscaping
- 1 .03.12.02 Corridor Landscaping

1 .03.13 Erosion Control
- 1 .03.13.01 Temp. Erosion Control
- 1 .03.13.02 Perm. Erosion Control
- 1 .03.13.03 Environmental Management

1 .03.14 Trail Facilities
- 1 .03.14.01 Multi-use Trail
- 1 .03.14.02 Pedestrian Trail
- 1 .03.14.03 Trailhead
- 1 .03.14.04 Berm

1 .03.15 MOT - Temporary Traffic
- 1 .03.15.01 Remove Pavement Markings
- 1 .03.15.02 Install Pavement Markings
- 1 .03.15.03 Traffic Control Devices
- 1 .03.15.04 Scheduled Traffic Switch

1 .03.016 Permanent Traffic
- 1 .03.16.01 Remove Pavement Markings
- 1 .03.16.02 Install Pavement Markings
- 1 .03.16.03 Traffic Control Devices
- 1 .03.16.04 Scheduled Traffic Switch

1 .04 Permits

1 .04.01 UDOT-Acquired Permits
1 .04.02 Contractor-Acquired Permits
1 .05 Utilities
1 .05.01 Third-Party Utility Relocations
1 .05.02 Contractor Utility Relocations
1 .06 Contract Changes
1 .06.01 Change Orders
1 .07 Punchlist & Clean-up

The Contractor shall fully utilize the WBS structure shown above and make every effort to enhance this structure. Proposed modifications to the WBS structure shall be submitted in the above format to UDOT for acceptance before implementation. The WBS structure shall be assigned consistently and uniformly among all similar activity types.

The duration of each activity shall include the necessary work days to actually complete the Work defined by the activity and shall be based on the quantity of work divided by a reasonably anticipated production rate(s). The Contractor shall include separate activities for cure time, inspections and submittal periods and other time consuming activities. The Contractor shall use an estimated submittal review period of seven (7) working days as the minimum UDOT submittal or resubmittal review periods for submittals such as mix designs, shop drawings, and other similar UDOT submittal requirements, unless directed otherwise UDOT.

Each activity shall be assigned a calendar. Each calendar, except the seven-day calendar, shall include UDOT holidays as non-work days. Each calendar shall include a reasonable number of anticipated non-work days due to potential weather related non-work days per month. The number of calendars shall be minimized to prevent the distortion of total float. Usage of multiple calendars shall be fully justified and is subject to UDOT's acceptance. The calendar(s) shall be updated monthly with actual days worked and days not worked prior to submittal of an updated Schedule. The calendar(s) shall be assigned consistently and uniformly among all similar activity types. Days not worked due to the Contractor's convenience will be deducted from time delay settlements.

All activity coding and calendars shall be shall have the "project" rather than "global" association.

D. Scheduling Conference

The Contractor shall schedule and UDOT will conduct a pre-construction scheduling conference with the Contractor's project manager and, qualified scheduler within fifteen (15) calendar days of Notice of Award. At this meeting UDOT will review the requirements of this section of the special provisions with the Contractor.

Items to be reviewed include, but are not limited to:

1. Review third party requirements and schedules.
2. Review submittal requirements and procedures.
3. Review requirements for tests and inspections.
4. Review and finalize a list of construction activities to be included in the Schedule.
5. Review procedures for updating the Schedule.
6. Review proposed modifications to the activity ID, activity code and work breakdown structure.
7. Review cost and resource loading requirements.
8. Review reporting requirements

E. Preliminary Baseline Schedule

Beginning the week following the Pre-construction Scheduling Conference, the Contractor and the Contractor's Qualified Scheduler shall meet with UDOT to review the Preliminary Baseline Schedule development. The Preliminary Baseline Schedule review meetings will continue to be held every fourteen (14) calendar days, unless determined otherwise by UDOT, during the process leading to the Guarantied Maximum Price (GMP) and continue until the Preliminary Baseline Schedule is accepted by UDOT. The Preliminary Baseline Schedule will be come the Baseline Schedule for construction operations once accepted by UDOT

The Contractor shall submit to UDOT an acceptable Preliminary Baseline Schedule as a prerequisite to acceptance of the GMP and the start of construction operations. Failure to show due diligence during the Preliminary Schedule development process and providing of an acceptable Preliminary Baseline Schedule prior to acceptance of the GMP will result in the Level 1 and Level 2 Non-Compliance provisions within this specification.

The Contractor shall submit Preliminary Baseline Schedules as required, or as requested by UDOT, during the GMP development process. Revisions to the Preliminary Baseline Schedule shall be identified as Rev. 0, Rev. 1, etc, or as otherwise directed by UDOT.

The Contractor shall allow fifteen (15) calendar days for UDOT's review after the Preliminary Baseline Schedule and all support data are submitted, except that the review period shall not start until the previous Preliminary Baseline Schedule submittal has been reviewed. Preliminary Baseline Schedules that are not accepted or rejected within the review period will be considered not accepted by UDOT. The Contractor will organize and perform joint constructability reviews with UDOT and the Engineer.

The Preliminary Baseline Schedule shall include the entire scope of work and how the Contractor plans to complete all Work to be contracted. The Preliminary Baseline Schedule shall clearly show the activities that define the critical (longest) path. Multiple critical paths and near-critical paths shall be minimized by minimizing the number of predecessors and successor relationships between activities, illogical or redundant logic. A total of not more than thirty (30) percent of the Preliminary Baseline Schedule activities shall be critical or near critical, unless otherwise authorized by UDOT.

The Preliminary Baseline Schedule shall not extend beyond the Substantial Completion date for all work to achieve Substantial Completion. It shall also include all remaining activities to be completed for Physical Completion and Final Acceptance not exceeding the specified Physical Completion date. The Preliminary Baseline Schedule shall use the data date determined by UDOT and shall not include progress or as-built updates unless otherwise direct by UDOT. The

Preliminary Baseline Schedule shall not include negative float or utilize any other prohibited scheduling technique.

The Preliminary Baseline Schedule shall be supplemented with cost and resource allocations for every work activity and include time-scaled resource histograms (time-scaled with values based on early and late dates). The resource allocations shall be shown to a level of detail that facilitates report generation based on the WBS structure, activity coding, labor crafts and equipment classes for the Contractor and subcontractors and as otherwise directed by UDOT. The Contractor shall use typical composite crews based on work type to display the labor loading of on-site construction activities. Crew composition and working hours per day shall be specifically defined and apparent. The Contractor shall optimize and level labor to reflect a reasonable plan for accomplishing the Work. When multiple like crews and/or equipment are utilized concurrently, the Contractor must identify each like crew and/or equipment group separately and uniquely to assure that resources are not duplicated in concurrent activities. The time-scaled resource histograms shall show type of labor crafts and quantity of crews and equipment types and quantity to be utilized to complete the contracted Work. Additional details are provided under the Two (2) Week Detail Schedule section of these Special Provisions. UDOT may review the Preliminary Baseline Schedule activity resource allocations as necessary to determine if the Schedule is practicable.

The Preliminary Baseline Schedule shall be cost and resource loaded with a direct relationship with the OOCP or GMP through the use of cost coding, quantity and unit prices.

F. Schedule Updates

The Contractor shall submit an Updated Baseline Schedule with each payment request or as requested by UDOT. Schedule updates shall include all elements defined for the Preliminary Baseline Schedule except that the Updated Baseline Schedule shall include progress and as-built updates. The first Updated Baseline Schedule submittal shall be identified as “1. Updated Construction Baseline Schedule Rev. 0.” If revisions to the Schedule are required, the revisions shall be identified as 1a. Updated Construction Baseline Schedule Rev. 1, etc. Subsequent Updated Baseline Schedules shall be identified as 2. Updated Construction Baseline Schedule Rev. 0,3. Updated Construction Baseline Schedule Rev. 0, etc or as otherwise directed by UDOT.

The Contractor shall allow ten (10) working days for UDOT’s review after each Updated Baseline Schedule and all support data are submitted, except that the review period shall not start until the previous Updated Baseline Schedule submittal is accepted. Schedules that are not accepted or rejected within the review period will be considered not accepted by UDOT.

The Updated Baseline Schedules shall have a data date correlating with the end date of the payment request period as established by UDOT. Each Updated Baseline Schedule shall show the status of work actually completed up to the data date and the work remaining to be performed as planned. The Contractor shall ensure that the Updated Baseline Schedule accurately reflects “as-built” information for each activity shown on previous schedules, including, but not limited to, actual start dates (discounting early starts not representative of true as-built conditions), remaining days of work, duration, physical and units percents complete, actual finish dates (when the activities were completed so that dependent work could proceed), and actual resource utilization. Schedule calendars shall be updated to show actual days worked and days not worked.

The Updated Baseline Schedule's "actual units this period" shall be updated based on actual units of work completed. The value of the work completed will be the basis for payment for work completed during the period. Pay request reports shall be submitted to facilitate the payment process in a format acceptable to UDOT. Reports will identify the Activity, UDOT bid items associated with the activity, budget quantity, budget units, total budget cost, period and to date quantity and costs.

Updated Baseline Schedule updates shall accurately represent all planning changes, adjustments, or updates in the sequencing and timing of work remaining made or required to be made to ensure that the Updated Baseline Schedule stays current with the Contractor's revised plan for performing and furnishing work remaining, or to recover schedule. If the Updated Baseline Schedule submittal indicates slippage or delayed progress caused by delays failing to meet the requirements for extensions in Contract Time, the Contractor shall identify the cause and responsibility of the slippage or delayed progress and include a mitigation strategy within the narrative. Any revisions made due to the issues covered under this paragraph shall be considered revisions made for the Contractor's convenience, and shall be excluded when reconciling an extension to a Milestone or Contract Time until the timing and sequences purported by those revisions actually take place.

The Contractor may propose modifications by adding or deleting activities or changing activity descriptions, durations or logic that do not (1) alter the critical path(s) or near critical path(s) or (2) extend the scheduled completion date compared to that shown on the current accepted Updated Baseline Schedule and (3) do not disrupt the integrity or comparative relationship between the current and Preliminary Baseline, or previous Updated Baseline Schedules, or Project level schedules. The Contractor shall minimize the number of changes and state in writing within the update narrative the reason and justification for any changes to Updated Baseline Schedule or planned work. UDOT shall review the justification for changes and either accept or reject the proposed modifications.

If any proposed changes to the schedule or planned work will result in (1), (2) or (3) above, then the Contractor shall submit a time impact analysis as described herein.

The Contractor shall implement logic changes to allow the out of sequence work to proceed after approval by UDOT. The use of negative lag shall not be permitted.

The Contractor shall incorporate planning revisions, which have been agreed upon in Contract Changes ordered since the last revision. Those revisions shall conform to the sequencing and time of performance requirements of the applicable instrument. These types of revisions shall be included in the Updated Baseline Schedule when reconciling extensions in Contract Time.

The Contractor shall illustrate, through submittal of a time impact analysis, the effects resulting from any claimed delays or Change Orders which are being negotiated between UDOT and the Contractor.

The Contractor shall be fully responsible for, and shall coordinate resolution of, Construction Discipline schedule changes that cause other Discipline schedules to accelerate, be delayed, or consume unreasonable an unreasonable amount of float as determined by UDOT.

G. Two (2) Week Detail Schedule

The Contractor shall prepare and submit a detailed two (2) week schedule to UDOT each week until all work is completed. The Two (2) Week Detail Schedule consist of the following:

1. Hand or computer generated bar chart schedule which spans a forward looking, rolling period of at least fourteen (14) calendar days from the date of submittal.
2. Updated and submitted to UDOT on a weekly basis.
3. Based on the accepted Updated Baseline Schedule and provide a greater breakdown of the work activities.
4. Specifically reference the accepted Updated Baseline Schedule activity ID numbers and define subsequent specific daily operations at each specific location for all work activities scheduled to be performed during the two (2) week period.
5. Developed to a level of detail acceptable to UDOT.

H. Network Diagrams, Reports and Data

The Contractor shall include the following for each Updated Baseline Schedule submittal:

1. Two (2) sets of originally plotted, time-scaled Gantt chart diagrams.
2. Two (2) copies of a narrative report.
3. Two (2) pay requests.
4. Two (2) CD-R (read only) containing a backup of the Primavera Project Management, Version 6.2 for Windows, in compressed format (XER files) schedule files.

The time-scaled Gantt chart diagrams shall conform to the following:

5. Show a continuous flow of information from left to right.
6. Be based on early start and early finish dates of activities.
7. Show activity float.
8. Clearly show the longest path in red color.
9. Be prepared on E-size sheets{34 inch x 44 inch}.
10. Include a title block and a timeline on each page.
11. Be grouped and sorted as directed by UDOT.

The narrative report shall include a description of, and thorough justification for, any changes made to the current Updated Baseline Schedule, and the effects resulting from such changes, when compared to the previous version of the Updated Baseline Schedule. The narrative report shall be prepared in a consistent and professional manner which facilitates ease of use. The narrative report shall include a table of contents with page numbers. All pages, lists, charts and attachments shall be numbered and titled. The narrative report shall be organized and tabbed in the following sequence and include all applicable and appropriate supporting documentation including, but not limited to:

12. Contractor's transmittal letter.
13. Narrative description of the construction philosophy supporting the approach to the Work outlined in the Updated Baseline Schedule. Address reasons for the sequencing of Work and describe any problem areas and identification of unusual conditions or restrictions regarding labor, equipment or material, such as multiple shifts, specified overtime or work at times other than regular days, potential conflicts, and other salient items that may affect the schedule and how they may be resolved.
14. Narrative description of the general status of the Project including work completed during the period, work to be completed during the next reporting period, current total float and validity of the calculated percent complete.
15. Narrative description of the difference between previously planned work and the actual work performed including an explanation for the deviations.
16. A copy of the WBS structure with identification of changes or modifications.
17. A copy of the activity coding with identification of changes or modifications.
18. Crew and or labor definitions with scheduled working days and hours per day.
19. Equipment resource code definitions.
20. Graphical time-scaled resource graphic charts with a narrative description of changes to the.
21. Non-typical production rates with justification thereof.
22. A listing of activity durations exceeding the 20 working days with justification thereof.
23. A list of activity relationships with lags with justification for use of the lag.
24. A list of constrained activities with a justification for use of the constraint.
25. Schedule changes - A listing of all changes, and a narrative description of the reason or justification for the changes and the resulting affects or impact of the changes:
    a. Activities that have been added, deleted or modified.
    b. Relationships and logic.
    c. Schedule calendars, other than as-built data.
    d. Activity durations.
    e. Total float.
    f. Early and late start dates.
    g. Early and late finish dates.
26. Narrative description of the current critical path.

27. Comparative analysis of changes to the critical path with the previous schedule submittal, including identification of and justification for the cause of the changes.
28. Changes to the scheduled completion date since the last Updated Baseline Schedule submittal including identification of and justification for the cause of the change.
29. Current and anticipated delays:
    a. Cause of delay.
    b. Impact of delay on other activities, milestones and completion dates.
    c. Corrective action, mitigation plan and schedule adjustments to correct the delay.
30. Pending items and status thereof:
    a. Permits
    b. Contract changes
    c. Time adjustments
    d. Non-compliance notices
    e. Time Impact Analysis
31. Graphical time-scaled cost and resource graphic charts (S curve with bar charts and histogram) shall be software-generated from the Updated Baseline Schedule data to the level of detail and format acceptable to UDOT. In general, graphic reports shall be generated for all major work elements to at least level three (3) of the WBS including, but not limited to concrete paving, asphalt paving, bridges, drainage, excavation, embankment, electrical, signage, etc. Actual versus planned (forecasted) cost and resource loading for major activity groups and, or resource type by pay period in histogram format for the duration of the Project including a early, late and actual cumulative curves over the duration of the Project. Graphical reports shall be sized such that the information illustrated is legible.

Schedule submittals will only be considered complete when all documents and data have been provided as described above.

I. Time Impact Analysis

The Contractor shall submit a written time impact analysis (TIA) to UDOT with each request for adjustment of Contract time, when the Contractor or UDOT consider that an accepted or anticipated change may impact the critical path or Contract progress, or when directed by UDOT. The Contractor shall take all steps necessary to mitigate the effects to cost and, or time resulting from impacts caused by delay regardless of who is found responsible for the delay.

The TIA shall illustrate the impacts of each change or delay on the current scheduled completion date or internal milestone, as appropriate. The analysis shall use the accepted Updated Baseline Schedule that has the closest data date prior to the event. If UDOT determines that the accepted Updated Baseline Schedule used does not appropriately represent the conditions prior to the event, the accepted Updated Baseline Schedule shall be updated to the day before the event being analyzed. The TIA shall include an impact schedule developed from incorporating the event into the accepted Updated Baseline Schedule by adding or deleting activities, or by changing durations or logic of existing activities to accurately represent the impact. If the impact schedule shows that incorporating the event modifies the critical path and scheduled completion date of the accepted Updated Baseline Schedule, the difference between scheduled completion dates of the two schedules may be considered for an adjustment of Contract time. UDOT may construct and

utilize an appropriate Project schedule or other recognized method to determine adjustments in Contract time until the Contractor provides the TIA.

The Contractor shall submit a TIA in duplicate within fifteen (15) calendar days of receiving a request for a TIA from UDOT. The Contractor shall allow UDOT fifteen (15) calendar days after receipt to accepted or reject the submitted TIA. All accepted TIA schedule changes shall be shown on the next Updated Baseline Schedule.

If a TIA submitted by the Contractor is rejected by UDOT, the Contractor shall meet with UDOT to discuss and resolve issues related to the TIA. If agreement is not reached, the Contractor will be allowed fifteen (15) calendar days from the meeting with UDOT to give notice in conformance with the provisions in Section 00555S of these Special Provisions. The Contractor shall only show actual as-built work, not unaccepted changes related to the TIA, in subsequent Updated Baseline Schedules. If agreement is reached at a later date, accepted TIA schedule changes shall be shown on the next Updated Baseline Schedule.

Failure to furnish a TIA upon request by UDOT will result in the Level 1 and Level 2 Non-Compliance provisions within this specification.

A time impact analysis shall consist of one or all of the steps listed below:

Step 1. Establish the status of the Project before the impact using the most recent approved Updated Baseline Schedule prior to the impact occurrence.

Step 2. Predict the effect of the impact on the most current accepted Updated Baseline Schedule prior to the impact occurrence. This requires estimating the duration of the impact and inserting the impact into the impact schedule. The Contractor shall demonstrate how the impact was inserted into the schedule using a fragment. This is the presentation of a fragmentary portion of the schedule network showing the added or modified activities and the added or modified relationships. Any other changes made to the schedule including modifications to the calendars or constraints shall be noted.

Step 3. Track the effects of the impact on the schedule during its occurrence. Note any changes in sequencing, and mitigation efforts.

Step 4. Compare the status of the Work prior to the impact (Step 1) to the prediction of the effect of the impact (Step 2), and to the status of the Work during and after the effects of the impact are over (Step 3).

J. Use of Float

Total Float and Contract Float are not for the exclusive benefit of the Contractor or UDOT, but is an expiring resource available to the Project, to accommodate changes in the Work, however originated, or to mitigate the effect of events which may delay performance or completion of all or part of the Work within the Late Dates, the Contractor's anticipated completion, or Contract Time. Contract time extensions for Contract performance may be granted only to the extent that delays or disruptions to affected work paths exceed total float along those paths of the current Updated Baseline Schedule in effect at the time of delay or disruption. Delays and disruptions which cause the end date of Work to exceed current Contract completion date must be beyond control and without fault or negligence of the Contractor or any subcontractor at any tier. In the event that the delays or disruptions impact an already negative float path, the Contractor will not receive a time

extension unless and until the activity with the highest negative float is driven even further negative. Delays or disruptions will not be considered a basis for time extension to this Contract unless and until such delays or disruptions are resolved as set forth in the Contract Documents.

Pursuant to the float sharing requirements of this Section, the use of float suppression techniques such as preferential or logic sequencing (crew movement, equipment use, etc.), special lag/lead restraints, and extended activity times or duration, imposed dates, scheduling of work not required for the Project as required work, and others, are expressly prohibited. Use of float time disclosed or implied by use of alternate float suppression techniques shall be shared to the benefit of both UDOT and the Contractor. Use of any network techniques solely for the purpose of suppressing float will be cause for rejection of Schedule submittal. The Contractor shall adjust or remove any float suppression techniques as a prerequisite to a request for a schedule-related increase in compensation or a request for extension of time.

K. Schedule Recovery

Unless otherwise directed by UDOT, whenever critical items of construction fall behind the planned Schedule or when items which were not critical become critical the Contractor shall promptly notify UDOT and undertake appropriate action at no additional cost to UDOT to recover schedule.

The Contractor shall submit, following recognition of the problem, a written recovery statement to UDOT describing the cause for the slippage and the actions planned by the Contractor to recover Schedule within the shortest reasonable time whenever the Contractor fails to complete activities within the Late Dates in the Updated Baseline Schedule.

The Contractor's refusal, failure or neglect to take appropriate recovery action or to submit a written recovery statement shall constitute reasonable evidence that the Contractor is not prosecuting the Work, or separable part, with the diligence that will insure its completion within the applicable Contract Time and shall constitute sufficient basis for UDOT implement the Level 1 and Level 2 Non-Compliance provisions within this specification, and or identify and order alternate recovery actions on the basis of the information in the Updated Baseline Schedule.

L. Schedule Reviews

UDOT's Schedule reviews will be for conformance with the Contract Time and those sequences of Work indicated in or required by the Contract Documents, to record Early and Late Dates for Milestones, to identify the Contractor's use of Float, to compare as-built data, and for conformance with the requirements of this Section and other information given in the Contract Documents which may have a bearing on the Updated Baseline Schedule. UDOT's review may extend to the accuracy of other matters dealt with by the Updated Baseline Schedule, including, but not limited to, whether work is omitted, activity durations are reasonable, the level of labor, materials and equipment, the Contractor's means, methods, techniques, procedures, or sequences of construction, or whether the sequences and timing for work remaining are practicable, the correctness of all which shall remain the sole responsibility of the Contractor. UDOT's review may also extend to the technical acceptability of the Updated Baseline Schedule submittal.

Upon completion of a review, UDOT will notify the Contractor by letter that the Schedule submittal is either "Revise and Resubmit" or "Acceptable." Submittals found "Acceptable" will represent the

most-current Updated Baseline Schedule as of the date of the submittal. Neither UDOT's review of a schedule, nor UDOT's statement of "Acceptable," will relieve the Contractor from responsibility for complying with the Contract Specifications, Contract Time requirements and completing all Work required by the Contract Documents. Failure by the Contractor to include any element of the Work required by the Contract does not relieve the Contractor from its responsibility to complete the Work, or to complete the omitted Work within the Contract Time(s). "Acceptance" of the Updated Baseline Schedule submittals by UDOT does not attest to the validity of assumptions, production rates, activities, relationships, sequences, resource allocations or any other aspect of the Updated Baseline Schedule submittal. Updated Baseline Schedule submittals determined to be "Acceptable" by UDOT may be reviewed again for "Acceptability" at a later date, if deemed necessary by UDOT. The Contractor remains obligated to correct schedule issues identified during future reviews by UDOT.

The Contractor shall make appropriate adjustments or corrections in an Updated Baseline Schedule submittal returned as "Revise and Resubmit," and shall respond with the required copies of a full, revised Updated Baseline Schedule revision submittal within ten (10) calendar days of receipt of UDOT's comments. Once the Contractor's Updated Baseline Schedule submittal, or resubmittal, is returned to the Contractor as "Acceptable," it shall represent the most current approved Updated Baseline Schedule for the Work as of the date of the submittal, and it shall be the basis for the monitoring of the Contractor's performance and progress.

The most-current Updated Baseline Schedule will be the basis for (a) the monitoring of the Contractor's progress against Milestone and Contract Times, and (b) the evaluation and reconciliation of extensions in Contract Time, if and when a Contract Time is indeed extended.

All schedules shall be in accordance with the Contract Time requirements of the Contract. Nothing contained in this Section shall relieve the Contractor from compliance with the Contract Time.

UDOT may elect to review a Updated Baseline Schedule submittal with negative Total Float values of twenty (20) working days or less. Upon review, that submittal will be returned to the Contractor as "Revise and Resubmit."

If UDOT elects to review an early-completion Schedule submittal showing activities on the Critical (longest) Path with Total Float less than the appropriate Contract Float, he will do so with the understanding that Schedule is to be deemed to include an Activity at the end of the Critical Path of duration equal to the difference between the Contract Float and the shown Total Float values.

The review of a portion of the Updated Baseline Schedule or an incomplete Updated Baseline Schedule submittal shall not indicate acceptance of the entire Updated Baseline Schedule.Non-Compliance

1. Level 1 Non-Compliance – UDOT will remedy the nonconformance by retaining an amount equal to fifteen (15) percent of the total estimated value of the work performed during each period in which the Contractor fails, refuses or neglects to satisfy the requirements of this specification, or the Updated Baseline Schedule submittals precludes a proper evaluation by UDOT, or the Updated Baseline Schedule submittals preclude an "Acceptable" determination, or if the Contractor fails to conform said submittals within the submittal time requirements herein. Retention due to this non-conformance shall be in addition to all other retentions provided for under the Contract. The retention withheld for Level 1 Non-Compliance will be released for payment on the next monthly estimate for partial payment following the date

UDOT determines compliance has been achieved and, or the submittal(s) are found "Acceptable."

2. Level 2 Non-Compliance – If UDOT determines that Level 1 Non-Compliance still exists and, or the submittals cannot be found "Acceptable" within fifteen (15) calendar days of implementation of Level 1 Non-Compliance, the Contractor shall be penalized a non-recoverable sum of money per calendar day, with said monies to be deducted from monies due on the next monthly estimate, until the date UDOT determines compliance has been achieved and, or the submittal(s) are found "Acceptable." Level 2 Non-Compliance penalties shall be in addition to the Level 1 Non-Compliance retention.
3. These remedies for the Contractor's failure, neglect or refusal to comply with the requirements of this Section are in addition to, and not in limitation of, those provided under the Contract.